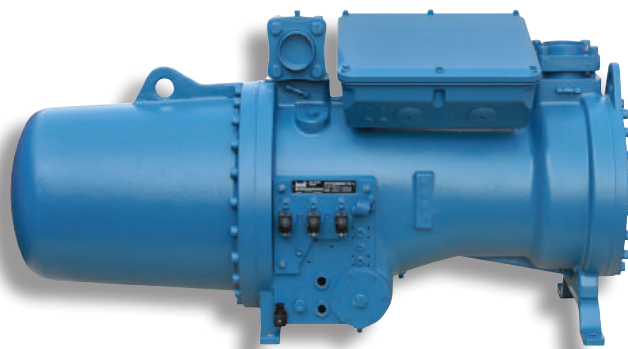


Frascold®

CX

Frascold semi-hermetic compact screw compressors

for refrigeration, air conditioning, heat pump, process cooling



Semi-Hermetic compact screw compressors

Semi-Hermetic compact screw compressors

CX Series

Frascold CX compact screw compressors range has been designed to grant the maximum efficiency, reliability and flexibility. Currently the range consists of 566 models, which cover not only a wide cooling capacity range but also an extremely various application range (air conditioning, process cooling, heat pumps and even refrigeration at medium evaporating temperatures).

All models are characterized by:



CX Series

Frascold compact screw compressor can be used with the most common refrigerant gases in a very wide envelope and according to the working conditions it is possible to identify two main configurations for assuring the highest efficiency:

CXH **Vi = 3.1** suitable for high compression ratios (typically air-cooled units)
CXW **Vi = 2.3** suitable for low compression ratios (typically water-cooled units)

To widen even further the application envelope it is possible to adopt an oversized motor (motor 2) as shown in the working limits of following pages.

Models identified with “CX_I” are those suitable for being matched with an external VFD, while those identified with “CX_IT” have a built-in VFD and are factory set and tested according to customer parameters.

Models identified with “CX_IV” and with “CX_ITV” are similar to those just described but are equipped with the optional device ACVR (Automatic Continuous Vi Regulation) which optimizes automatically and continuously the compressor’s Vi to the actual pressure ratio, thus granting for each working condition and load the maximum efficiency.

Models identified with “CX_P” are those specifically designed for applications with flooded type evaporators and can be used also in parallel compound. Their performances are basically those of CXH and CXW models, but have a different lay-out characterized mainly by the absence of the integrated oil separator. They have an insulated bell to minimize pulsations and noise and a rotalock connection for oil return from external oil separator. Furthermore the check valve on discharge side, the oil filter and the oil flow switch are integrated, making it possible to simplify the external oil line.

A dedicated version of CX series complies with ATEX zone 2 certification (directive ATEX 2014/34/UE; designation CE Ex II 3G cb IIB T3 -20°C<Ta<+60°C) and is meant for applications with HC or HFO, i.e. with R290, R1270 or R1234ze just to mention the most common flammable or mildly flammable refrigerants used nowadays. The name of this dedicated models will end with “AX”. They are delivered with ATEX-certified components, with integrated oil flow switch and without oil charge.

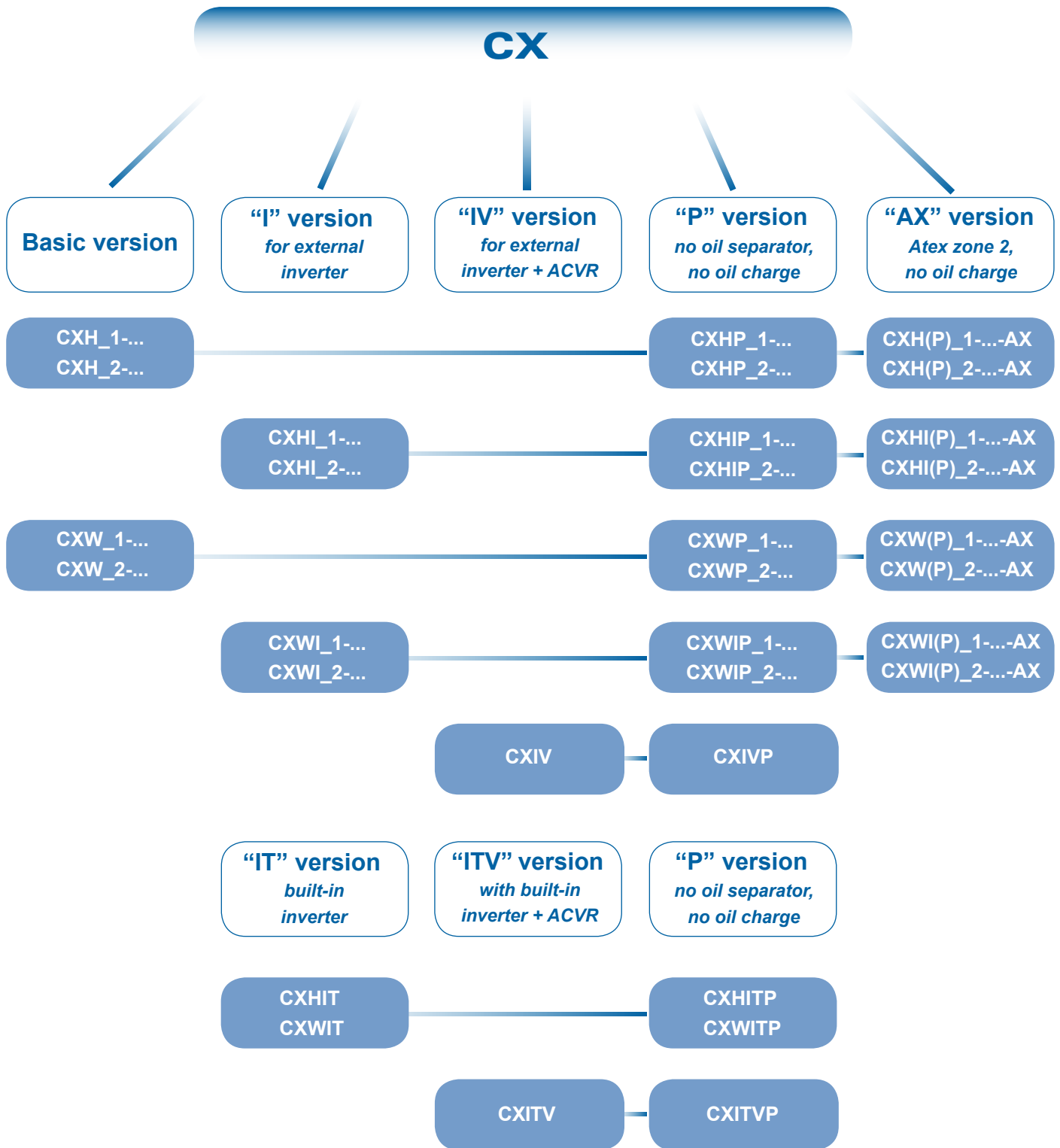
Thanks to the latest and most advanced production technologies and quality procedures and thanks to a design focused on optimizing the fluid dynamics, safety, flexibility and durability, the compressor operation is always efficient, silent and reliable. Apart from VFD-driven models, the capacity control is achieved through the hydraulic movement of a slide valve and such system provides for high efficiencies at any loads. However to increase further their efficiency all models can also work with economizer. The sophisticated 3-stage oil separation system grants min oil carry-over, while the correct lubrication can be monitored through suitable devices and accessories.

Finally, all models but those with built-in inverter or those ATEX certified can be manufactured according to UL certification.

All possible configurations are summarized in the schematic below, while specific performances, envelopes and technical features are reported in the following pages.



Possible Configurations



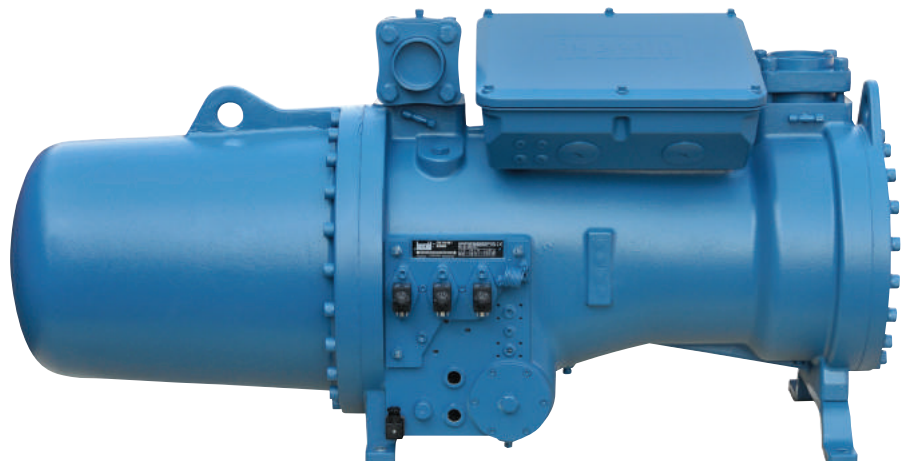
H	Vi = 3.1 - version for high compression ratio	1	small size motor
W	Vi = 2.3 - version for low compression ratio	2	full size moto
-	compressor frame size (0 = small; 5 = medium; 9 = big)	ACVR	Automatic Continuous Vi Regulation (option)

Model Designation

Compressor

CX H 5 1 - 125 - 468 Y

Family series	
Compact Screw Compressor	
Application (pressure ratio)	
H	Vi = 3.1
W	Vi = 2.3
HI - WI	Suitable for external VFD
IV	Suitable for external VFD+ACVR
HIT - WIT	With built-in VFD
ITV	With built-in VFD+ ACVR
All Above + P	For parallel compound and/or flooded type evaporator
Frame size	
0	Small
5	Medium
9	Big
Motor size	
1	Small
2	Full
Nominal motor power	
50 ÷ 310 Hp	
Displacement	
199 ÷ 1085 m ³ /h at 50Hz	
Customization	
Y	Standard Version
AX	Atex zone 2 version



Semi-Hermetic compact screw compressors

Extent of Delivery

PWS or SDS electric motor thermally protected:

FRAME SIZES 0 AND 5:

1. DOL YY - 380-420 V / 3 / 50 Hz
(440-480 V / 3 / 60 Hz)
2. PWS Y/YY - 380-420 V / 3 / 50 Hz
(440-480 V / 3 / 60 Hz)

FRAME SIZE 9:

SDS Y/D 380-420 V / 3 / 50 Hz
(440-480 V / 3 / 60 Hz)

CXI(V)(P) AND CXIT(V)(P):

admissible power supply
380 ÷ 460 Vca (-15% +10%), 45...65 Hz

Electronic control module INT69FRY with monitoring and protection functions (AC 50-60 Hz 115-120V 230-240 V +/- 10% 3VA).

Integrated 3-stage oil separator
Thermostatically controlled crankcase heater
POE 170 cSt oil charge (no oil charge for "P" and "AX" models)
Oil filter with replaceable cartridge
2 sight glasses for min and max oil level control
Discharge shut-off valve with soldering connection and integrated check valve
Suction flange with solder sleeve
Internal safety valve
Step capacity control & start unloader (coils at 230 V / 1 / 50-60 Hz)
Discharge temperature PTC sensor
Nitrogen protective charge
Packing ensuring proper handling and adequate protection

Electrical box:
IP65 (IP54 for CXIT(V)(P) models and for "CX...- AX models)



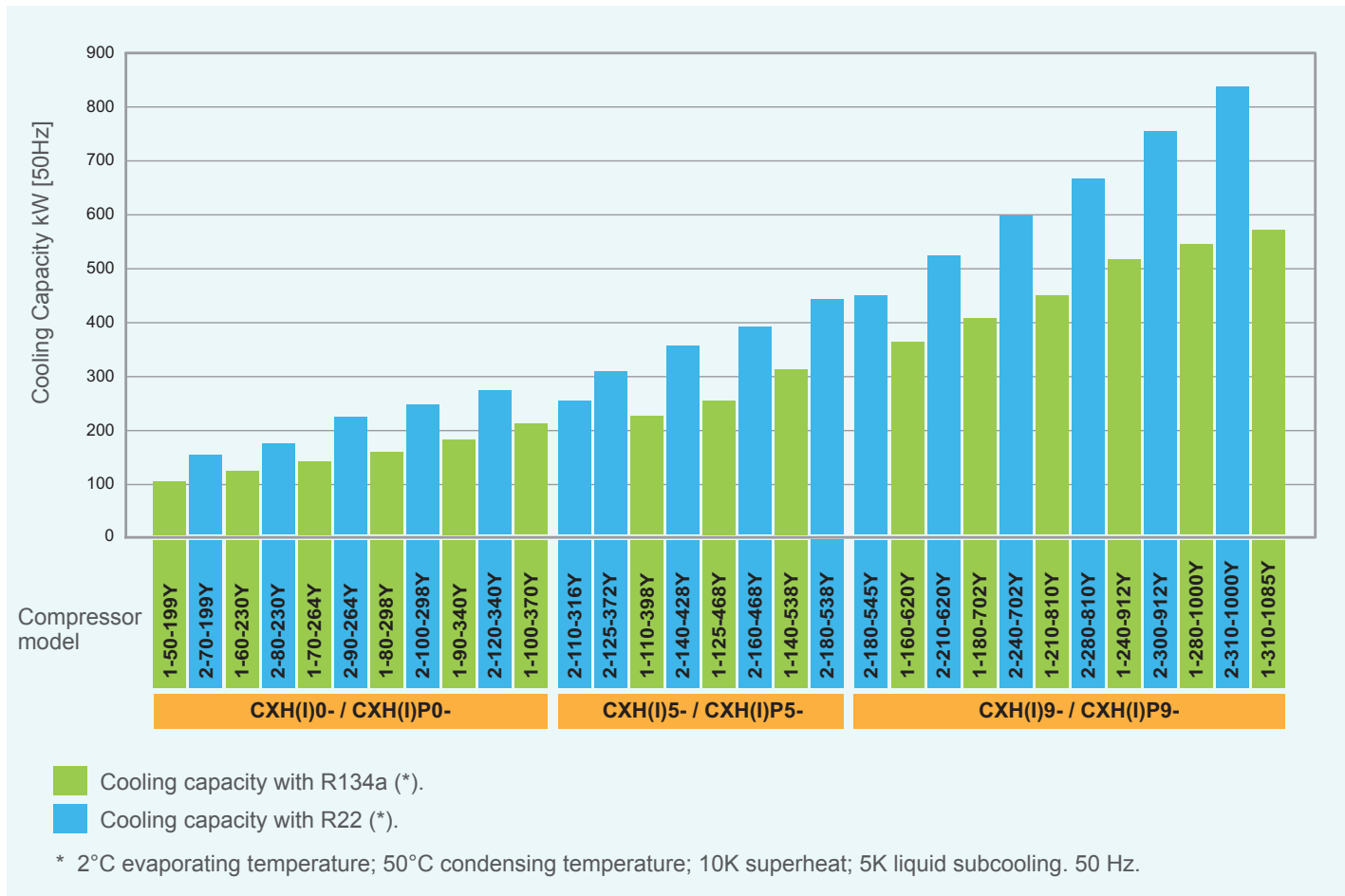
Options



Different motor voltages
Stepless capacity control (suggested 100% - 50%)
Solenoid valves for special voltages
Axial suction connection (frame 9 only)
Different pipe connection sizes
Suction shut-off valve
Opto-electronic oil level control (230 V / 1 / 50-60 Hz)
Oil flow switch
Oil filter clogging differential pressure switch
Connection kit for liquid injection or ECONomiser (soldering shut-off valve and pulsation muffler)
Connection kit for external oil cooling circuit
Bridges for D.O.L start
Rubber vibration dampers
EMC filter for CX_IT(V)(P) series
INT69FRYL Diagnose (monitoring, protection, diagnostics, alarm history record and communication functions)
Special painting for off-shore installation (in compliance with C5M requirements)
ATEX Zone 2 approved version (excluded the versions with built-in inverter)
UL execution (excluded the versions with built-in inverter and the version certified ATEX zone 2)

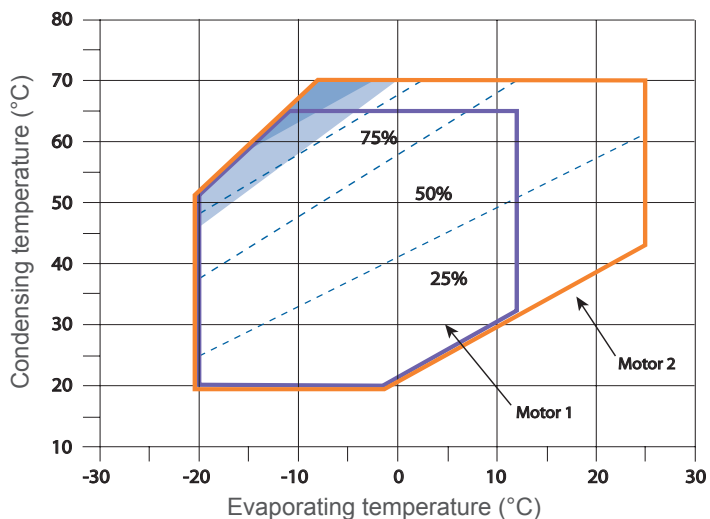
Semi-Hermetic compact screw compressors

CXH(I)-CXH(I)P (vi=3,1)



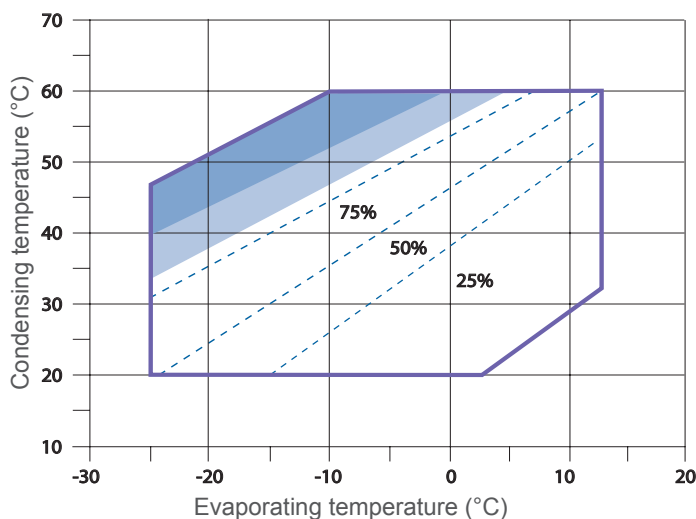
Working limits

R134a



- Full load operation (100%) - Motor 1
- Full load operation (100%) - Motor 2

R22



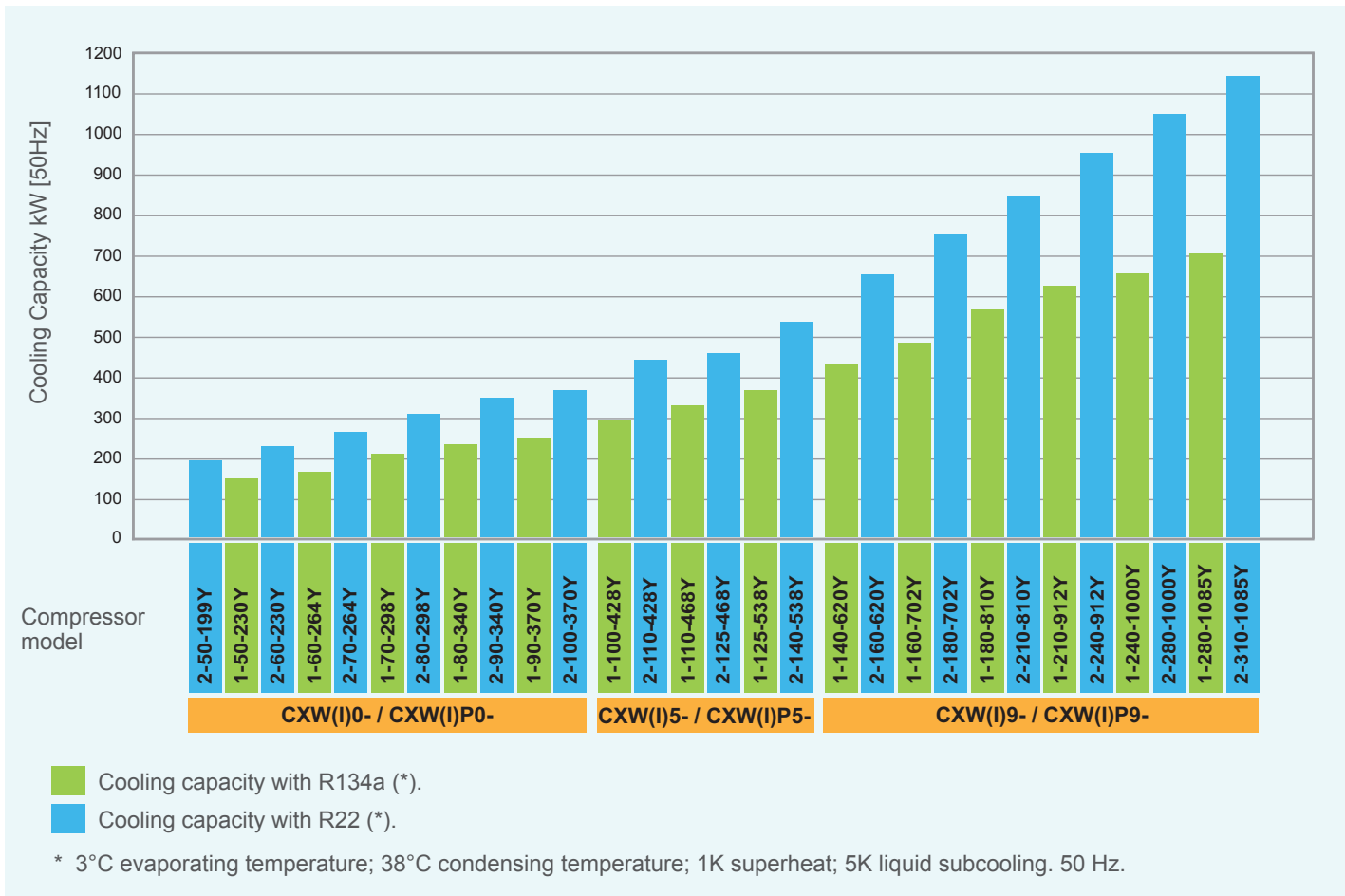
- With oil cooler
- With oil cooler or liquid injection

Suction gas superheating 10K - without liquid subcooling.

Note: For "I" version verify with the selection software the frequency limits for your application.

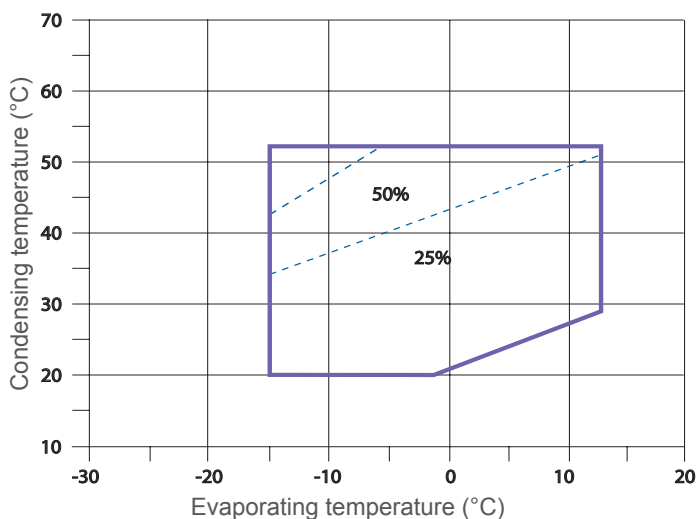
Semi-Hermetic compact screw compressors

CXW(I)-CXW(I)P (vi=2,3)

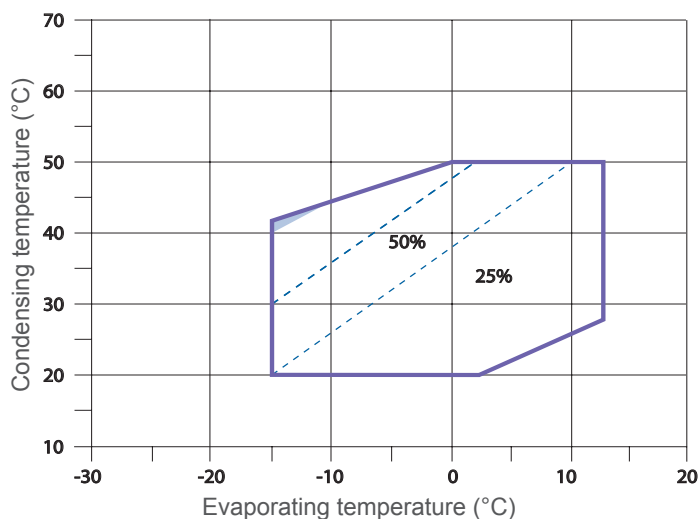


Working limits

R134a



R22



Full load operation (100%)

With oil cooler

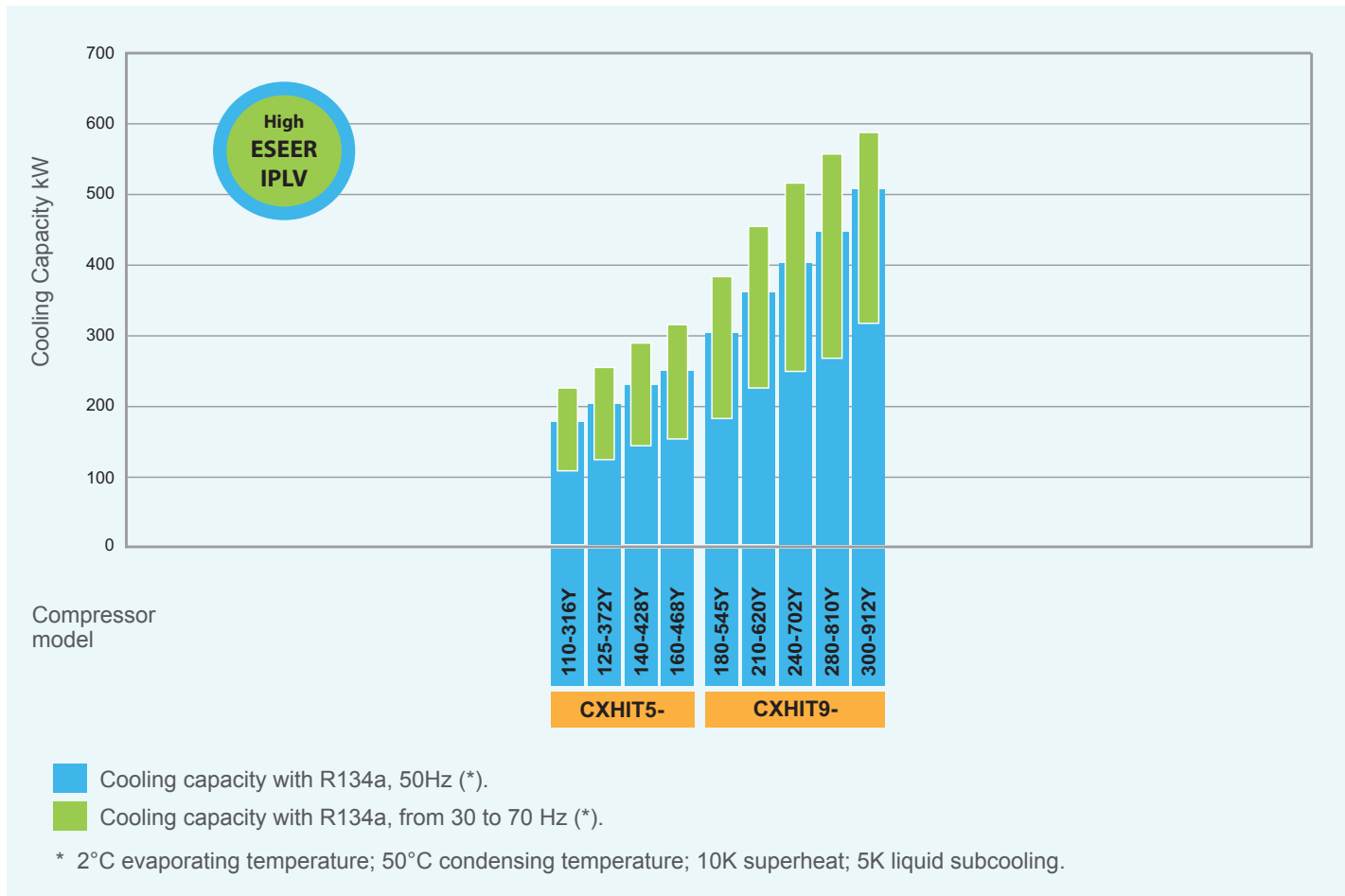
With oil cooler or liquid injection

Suction gas superheating 10K - without liquid subcooling.

Note: For "I" version verify with the selection software the frequency limits for your application.

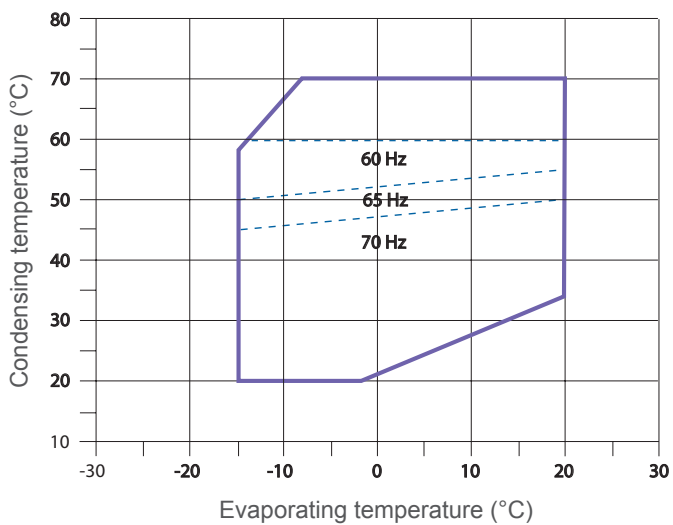
Semi-Hermetic compact screw compressors

CXHIT(P) (Vi=3,1)



Working limits

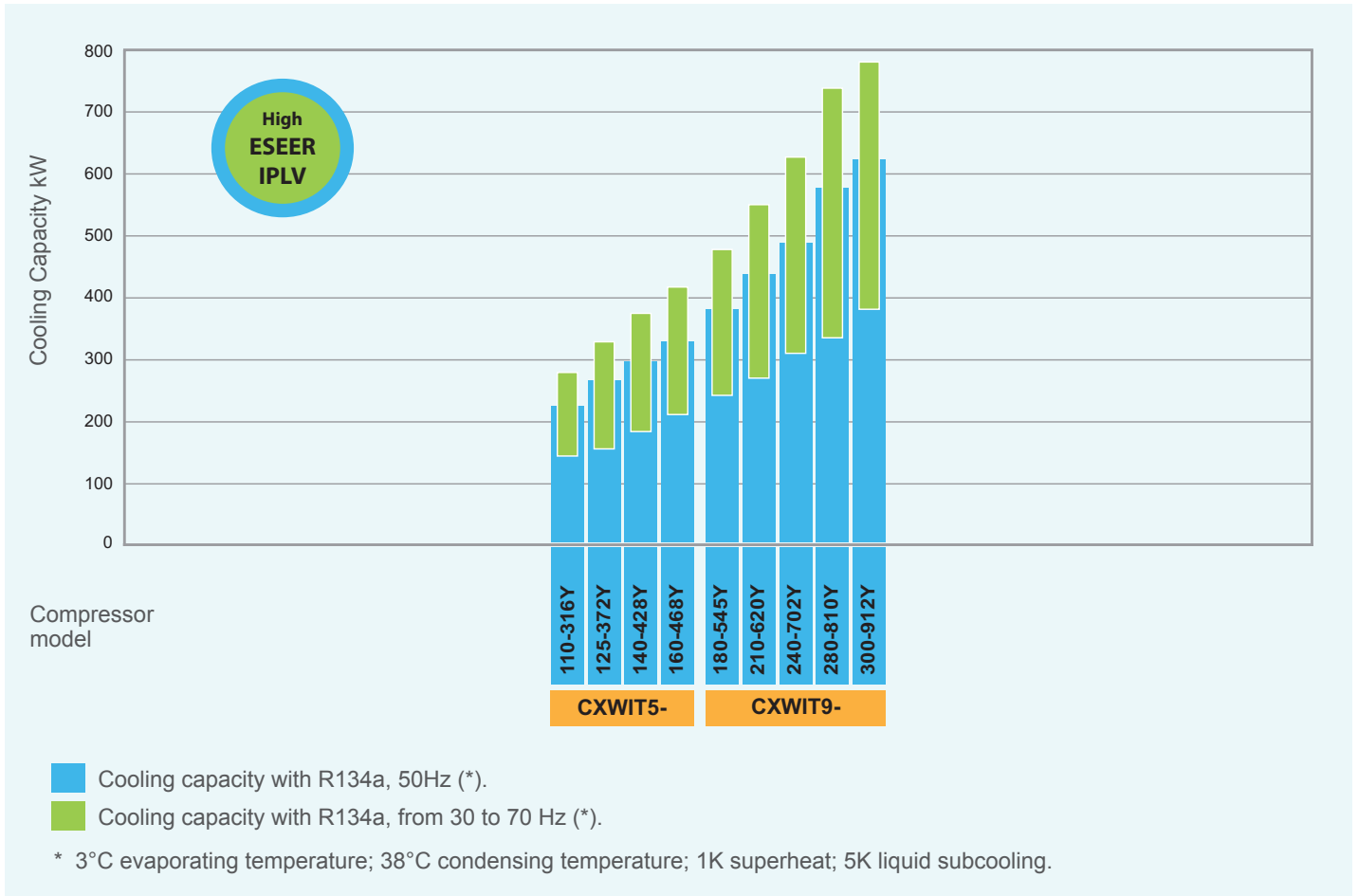
R134a



Suction gas superheating 10K - without liquid subcooling.

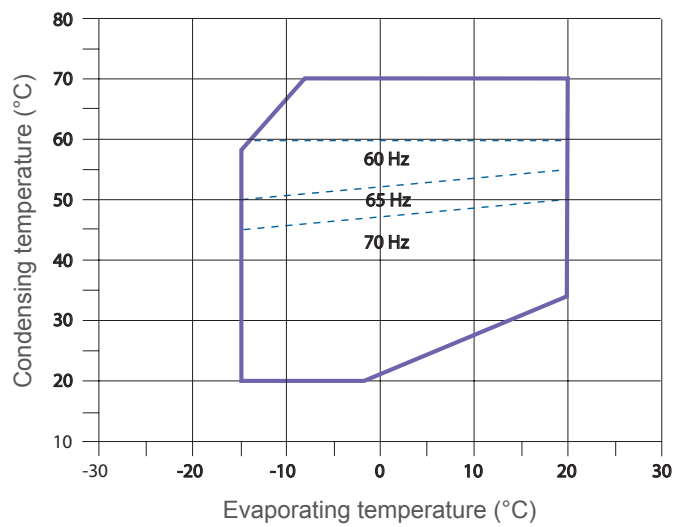
Semi-Hermetic compact screw compressors

CXWIT(P) (Vi=2,3)



Working limits

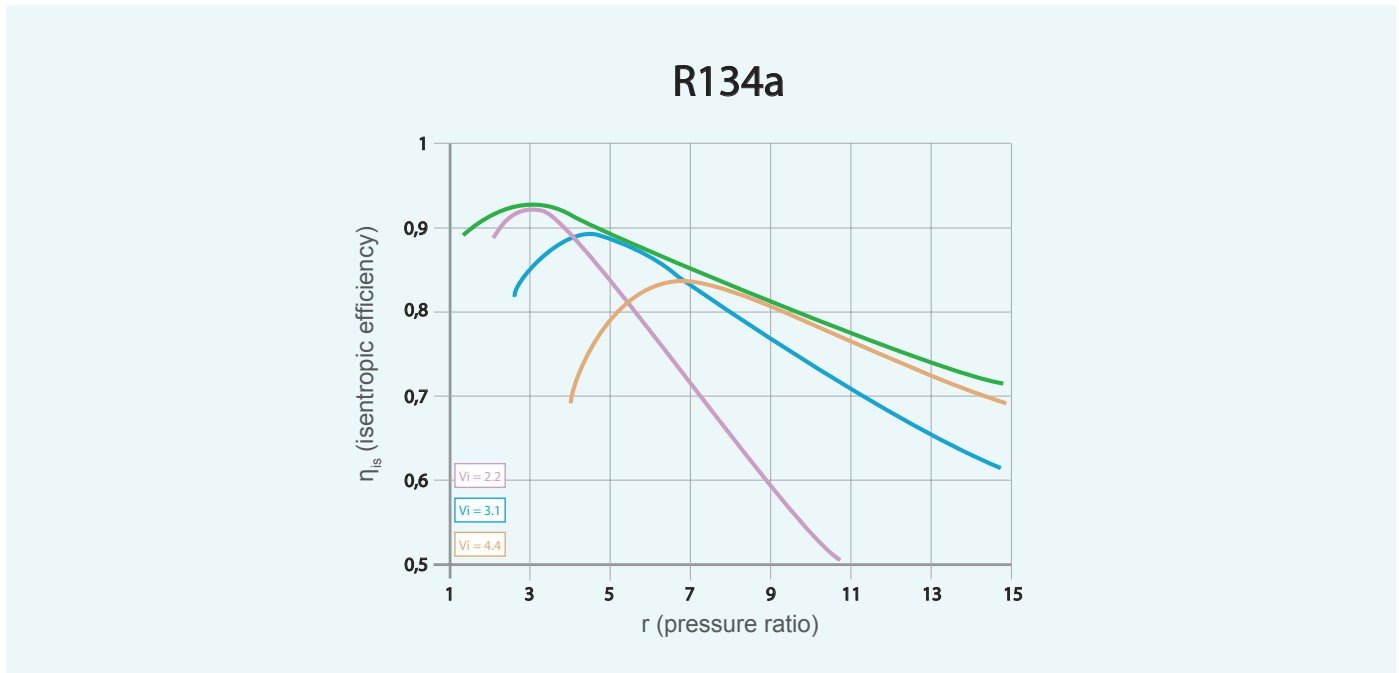
R134a



Suction gas superheating 10K - without liquid subcooling.

ACVR (automatic continuous Vi regulation)

The geometry of the discharge port of a screw compressor determines its built-in volumetric ratio (V_i). For each refrigerant and for each pressure ratio there is just one V_i that maximizes the isentropic efficiency, as it is clearly showed in the following picture.



Since the geometry of the discharge port is generally fixed, the market offers different series of compressors to suit applications with different nominal pressure ratios. For instance Frascold offers two different main ranges of traditional screw compressors: the CXH and the CXW models, whose built-in volumetric ratios are 3.1 and 2.3 respectively and with which it is possible to cover a wide range of applications.

However for a traditional screw compressor the maximum efficiency can be achieved only when the compressor is working at full load and when the pressure ratio value corresponds to the best one for its specific V_i , so at part loads and/or when the working conditions are different from the nominal ones, the efficiency of the compression decreases.

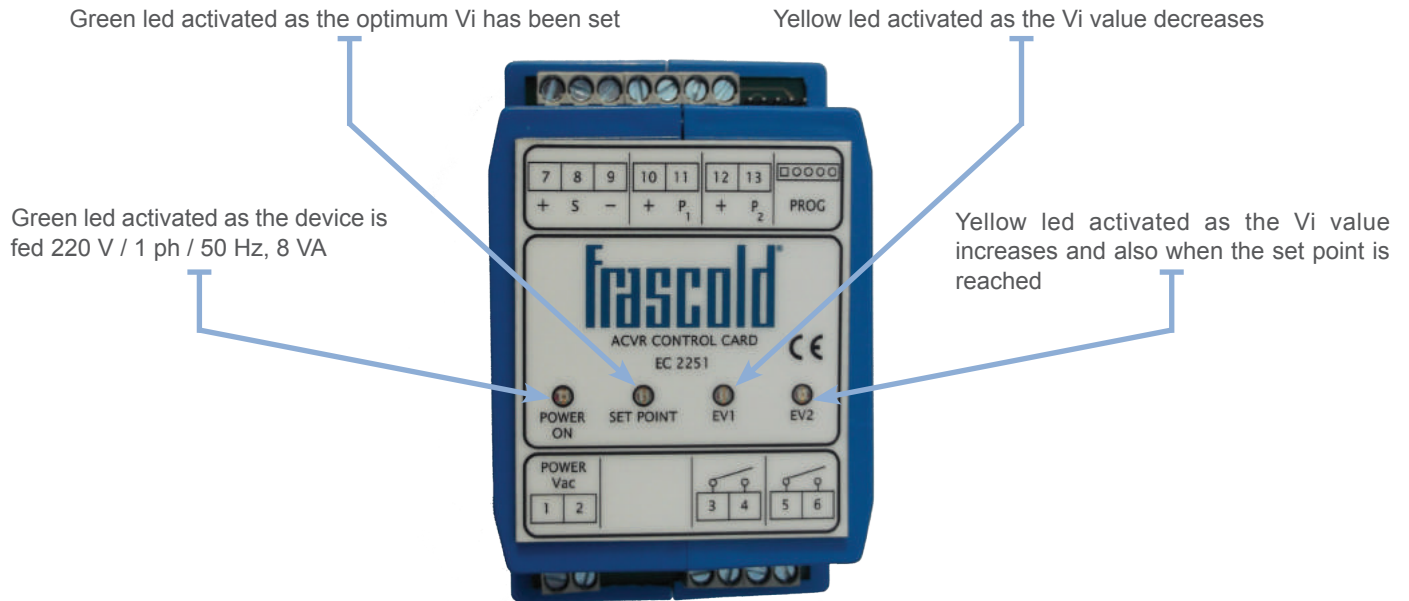
For screw compressors driven by a VFD, either built-in or external, Frascold has developed an innovative and unique device called ACVR that sets the best V_i in accord to the refrigerant and the actual pressure ratio (look at the green curve in the above picture as theoretical reference).

This optimization doesn't depend on the load and is delivered automatically by the ACVR itself. In fact the ACVR device always assigns to the compressor the best V_i choosing in a continuous range of possible values.

By working always with the maximum efficiency an inverter-driven compressor equipped with ACVR can really offer impressive energy savings. A case study of a process cooling unit with air-cooled condenser showed about 25% energy saving in one year for instance.

ACVR (automatic continuous Vi regulation)

ACVR Control Card



The device is mounted in the compressor electric box.

The standard solenoid valve coils have 230 V / 1 ph / 50 Hz power supply, however the ACVR can manage also other kind of voltages of the solenoid valve coils.

Semi-Hermetic compact screw compressors

Technical specifications

Product Specification	Nominal motor power		Displacement [50 Hz]	Weight	Weight "P" Version only	Oil charge ①	Discharge line		Suction line		Start method	Starting current		Max running current	Standard motor	Capacity control	ACVR System (only for model in "I" version)
	HP	kW					m ³ /h	kg	litres	mm		inch	mm				

CXH(I)(P)_1 / Motor 1 - High compression ratios

CXH(I)(P)01-50-199Y	50	37	199	490	487	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	203	330	80	400V/3/50HZ - 460/3/60HZ	Step: 100% - 75% - 50% - Start/Stop Stepless: 100% - 50% (suggested)	▲
CXH(I)(P)01-60-230Y	60	45	230	505	502	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	262	425	98			▲
CXH(I)(P)01-70-264Y	70	52	264	505	502	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	298	518	125			▲
CXH(I)(P)01-80-298Y	80	60	298	515	512	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	373	600	145			▲
CXH(I)(P)01-90-340Y	90	67	340	525	522	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	405	649	160			▲
CXH(I)(P)01-100-370Y	100	75	370	540	537	11	54	2 1/8"	104	4 1/8"	PWS / DOL	488	767	145			▲
CXH(I)(P)51-110-398Y	110	85	398	870	852	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	434	720	180			▲
CXH(I)(P)51-125-468Y	125	95	468	875	863	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	530	838	198			■
CXH(I)(P)51-140-538Y	140	105	538	878	866	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	587	921	221			▲
CXH(I)(P)91-160-620Y	160	120	620	1475	1449	26	80	3 1/8" *	104	4 1/8"	YΔ / DOL	436	1364	293			■
CXH(I)(P)91-180-792Y	180	135	792	1475	1449	26	80	3 1/8" *	104	4 1/8"	YΔ / DOL	465	1442	315			■
CXH(I)(P)91-210-810Y	210	157	810	1475	1449	26	104	4 1/8"	DN125	YΔ / DOL	586	1853	356	■			
CXH(I)(P)91-240-912Y	240	180	912	1490	1474	26	104	4 1/8"	DN125	YΔ / DOL	650	2029	427	■			
CXH(I)(P)91-280-1000Y	280	210	1000	1550	1534	26	104	4 1/8"	DN125	YΔ / DOL	805	2520	470	▲			
CXH(I)(P)91-310-1085Y	310	230	1085	1555	1534	26	104	4 1/8"	DN125	YΔ / DOL	805	2520	490	▲			

CXH(I)(P)_2 / Motor 2 - High compression ratios

CXH(I)(P)02-70-199Y	70	52	199	510	507	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	298	518	128	400V/3/50HZ - 460/3/60HZ	Step: 100% - 75% - 50% - Start/Stop Stepless: 100% - 50% (suggested)	▲
CXH(I)(P)02-80-230Y	80	60	230	520	517	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	373	600	145			▲
CXH(I)(P)02-90-264Y	90	67	264	520	717	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	405	649	160			▲
CXH(I)(P)02-100-298Y	100	75	298	525	522	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	488	767	175			▲
CXH(I)(P)02-120-340Y	120	90	340	537	534	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	505	793	195			▲
CXH(I)(P)52-110-316Y	110	85	316	865	853	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	434	720	184			■
CXH(I)(P)52-125-372Y	125	95	372	865	853	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	530	838	218			■
CXH(I)(P)52-140-428Y	140	105	428	875	863	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	587	921	245			■
CXH(I)(P)52-160-468Y	160	120	468	878	866	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	729	1114	282			■
CXH(I)(P)52-180-538Y	180	135	538	880	870	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	786	1209	304			▲
CXH(I)(P)92-180-545Y	180	135	545	1475	1449	26	80	3 1/8" *	104	4 1/8"	YΔ / DOL	465	1442	332			■
CXH(I)(P)92-210-620Y	210	157	620	1490	1474	26	80	3 1/8" *	104	4 1/8"	YΔ / DOL	586	1853	375			■
CXH(I)(P)92-240-702Y	240	180	702	1490	1474	26	80	3 1/8" *	104	4 1/8"	YΔ / DOL	650	2029	427			■
CXH(I)(P)92-280-810Y	280	210	810	1490	1474	26	104	4 1/8"	DN125	YΔ / DOL	805	2520	455	■			
CXH(I)(P)92-300-912Y	300	225	912	1490	1474	26	104	4 1/8"	DN125	YΔ / DOL	805	2520	474	■			
CXH(I)(P)92-310-1000Y	310	230	1000	1490	1534	26	104	4 1/8"	DN125	YΔ / DOL	805	2520	490	▲			

① No oil charge for CXH(I)P models and for "AX" version (Atex zone 2).

* Available upon request.

■ Available.

▲ Not Available.

Semi-Hermetic compact screw compressors

Technical specifications

Product Specification	Nominal motor power		Displacement [50 Hz]	Weight	Weight "P" Version only	Oil charge ①	Discharge line		Suction line		Start method	Starting current		Max running current	Standard motor	Capacity control	ACVR System (only for model in "I" version)
	HP	kW					m³/h	kg	litres	mm		inch	mm				

CXW(I)(P)_1 / Motor 1 - Low compression ratios

CXW(I)(P)01-50-230Y	50	37	230	490	487	11	11	2 1/8"	80	3 1/8" *	PWS / DOL	203	330	80	400V/3/50HZ - 460/3/60HZ	Step: 100% - 75% - 50% - Start/Stop Stepless: 100% - 50% (suggested)	▲
CXW(I)(P)01-60-264Y	60	45	264	500	487	11	11	2 1/8"	80	3 1/8" *	PWS / DOL	262	425	98			▲
CXW(I)(P)01-70-298Y	70	52	298	505	502	11	11	2 1/8"	80	3 1/8" *	PWS / DOL	298	518	125			▲
CXW(I)(P)01-80-340Y	80	60	340	510	507	11	11	2 1/8"	80	3 1/8" *	PWS / DOL	373	600	145			▲
CXW(I)(P)01-90-370Y	90	67	370	525	522	11	11	2 1/8"	80	3 1/8" *	PWS / DOL	405	649	160			▲
CXW(I)(P)51-100-428Y	100	75	428	845	830	19	19	3 1/8" *	104	4 1/8"	PWS / DOL	434	720	180			■
CXW(I)(P)51-110-468Y	110	85	468	850	838	19	19	3 1/8" *	104	4 1/8"	PWS / DOL	434	720	187			■
CXW(I)(P)51-125-538Y	125	95	538	865	853	19	19	3 1/8" *	104	4 1/8"	PWS / DOL	530	838	198			▲
CXW(I)(P)91-140-620Y	140	105	620	1450	1439	26	26	3 1/8" *	104	4 1/8"	YΔ / DOL	436	1364	255			■
CXW(I)(P)91-160-702Y	160	120	702	1465	1439	26	26	3 1/8" *	104	4 1/8"	YΔ / DOL	436	1364	283			■
CXW(I)(P)91-180-810Y	180	135	810	1465	1439	26	26	4 1/8"	DN125	YΔ / DOL	465	1442	315	■			
CXW(I)(P)91-210-912Y	210	157	157	1465	1439	26	26	4 1/8"	DN125	YΔ / DOL	586	1853	356	■			
CXW(I)(P)91-240-1000Y	240	180	180	1535	1515	26	26	4 1/8"	DN125	YΔ / DOL	650	2029	427	▲			
CXW(I)(P)91-280-1085Y	280	210	210	1535	1515	26	26	4 1/8"	DN125	YΔ / DOL	805	2520	455	▲			

CXW(I)(P)_2 / Motor 2 - Low compression ratios

CXW(I)(P)02-50-199Y	50	37	199	490	487	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	203	330	85	400V/3/50HZ - 460/3/60HZ	Step: 100% - 75% - 50% - Start/Stop Stepless: 100% - 50% (suggested)	▲
CXW(I)(P)02-60-230Y	60	45	230	505	502	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	262	425	101			▲
CXW(I)(P)02-70-264Y	70	52	264	505	502	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	298	518	125			▲
CXW(I)(P)02-80-298Y	80	60	298	515	512	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	373	600	145			▲
CXW(I)(P)02-90-340Y	90	67	340	525	522	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	405	649	160			▲
CXW(I)(P)02-100-370Y	100	75	370	540	537	11	54	2 1/8"	80	3 1/8" *	PWS / DOL	488	767	175			▲
CXW(I)(P)52-110-428Y	110	85	428	840	828	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	434	720	184			■
CXW(I)(P)52-125-468Y	125	95	468	875	863	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	530	838	219			■
CXW(I)(P)52-140-538Y	140	105	538	878	864	19	80	3 1/8" *	104	4 1/8"	PWS / DOL	587	921	235			▲
CXW(I)(P)92-160-620Y	160	120	620	1475	1449	26	80	3 1/8" *	104	4 1/8"	YΔ / DOL	436	1364	283			■
CXW(I)(P)92-180-702Y	180	135	702	1475	1449	26	80	3 1/8" *	104	4 1/8"	YΔ / DOL	465	1442	315			■
CXW(I)(P)92-210-810Y	210	157	810	1475	1449	26	104	4 1/8"	DN125	YΔ / DOL	586	1853	356	■			
CXW(I)(P)92-240-912Y	240	180	812	1475	1449	26	104	4 1/8"	DN125	YΔ / DOL	650	2029	427	■			
CXW(I)(P)92-280-1000Y	280	210	1000	1535	1515	26	104	4 1/8"	DN125	YΔ / DOL	805	2520	455	▲			
CXW(I)(P)92-310-1085Y	310	230	1085	1535	1515	26	104	4 1/8"	DN125	YΔ / DOL	805	2520	490	▲			

① No oil charge for CXH(I)P models and for "AX" version (Atex zone 2).

* Available upon request.

■ Available.

▲ Not Available.

Semi-Hermetic compact screw compressors

Technical specifications

Product Specification	Nominal motor power		Displacement [30 / 70 Hz]	Displacement [50 Hz]	Weight	Weight "P" Version only	Oil charge ①	Discharge line		Suction line		Max running current	Standard motor	Inverter contact output	ACVR System
	HP	kW						m³/h	m³/h	kg	litres				
CXHIT(P)_ / Built-in VDF - High compression ratios															
CXHIT(P)5-110-316Y	100	85	190 / 443	316	940	928	19	80	3 1/8" *	104	4 1/8"	184	400V/3/50HZ - 460/3/60HZ	Analog / Digital Software: Modbus or Frascold software	ACVR System available upon request
CXHIT(P)5-125-372Y	125	95	224 / 521	372	940	928	19	80	3 1/8" *	104	4 1/8"	218			
CXHIT(P)5-140-428Y	140	105	257 / 600	428	950	938	19	80	3 1/8" *	104	4 1/8"	245			
CXHIT(P)5-160-468Y	160	120	281 / 651	468	950	938	19	80	3 1/8" *	104	4 1/8"	282			
CXHIT(P)9-180-545Y	180	135	327 / 763	545	1555	1514	26	80	3 1/8" *	104	4 1/8"	332			
CXHIT(P)9-210-620Y	210	157	372 / 868	620	1570	1529	26	80	3 1/8" *	104	4 1/8"	375			
CXHIT(P)9-240-702Y	240	180	422 / 983	702	1570	1529	26	80	3 1/8" *	104	4 1/8"	427			
CXHIT(P)9-280-810Y	280	210	486 / 1134	810	1570	1529	26	104	4 1/8"	DN125		455			
CXHIT(P)9-300-912Y	300	225	548 / 1277	912	1570	1529	26	104	4 1/8"	DN125		474			
CXWIT(P)_ / Built-in VDF - Low compression ratios															
CXWIT(P)5-110-316Y	100	85	190 / 443	316	940	928	19	80	3 1/8" *	104	4 1/8"	184	400V/3/50HZ - 460/3/60HZ	Analog / Digital Software: Modbus or Frascold software	ACVR System available upon request
CXWIT(P)5-125-372Y	125	95	224 / 521	372	940	928	19	80	3 1/8" *	104	4 1/8"	218			
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CXWIT(P)9-210-620Y	210	157	372 / 868	620	1570	1529	26	80	3 1/8" *	104	4 1/8"	375			
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CXWIT(P)9-280-810Y	280	210	486 / 1134	810	1570	1529	26	104	4 1/8"	DN125		455			
CXWIT(P)9-300-912Y	300	225	548 / 1277	912	1570	1529	26	104	4 1/8"	DN125		474			

① No oil charge for CXH(I)P models and for "AX" version (Atex zone 2).

* Available upon request.



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